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| 10/711,537 | 09/24/2004 | Tony Yang | OMCP0003USA | 5536 |

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| EXAMINER | |
|---|---|
| HU, RUI MENG | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2618 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

winstonhsu.uspto@gmail.com
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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/711,537 | YANG, TONY | |
| | Examiner | Art Unit | |
| | RuiMeng Hu | 2618 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *03 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 July 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

### *Response to Amendment*

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 1-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mourant (US Patent 6687494)** in view of **Ciubotaru (US Patent 7043220).**

Consider **claim 1**, Mourant clearly discloses an image rejection mixer comprising (Abstract, figures 1a and 1b): an in-phase mixer for mixing a received RF signal with an

in-phase reference signal to produce a current mode in-phase mixed signal (column 1 lines 36-50, using a 90 degree phase shifted version of the local oscillator signal, commonly known as I and Q signals); a quadrature-phase mixer for mixing the received RF signal with a quadrature-phase reference signal to produce a current mode quadrature-phase mixed signal, the quadrature-phase reference signal and the in-phase reference signal having a substantially orthogonal phase difference (considering I and Q signals are in 90 degree phase difference); and a polyphase filter network (figures 1a and 1b, phase shifter and combining circuit 24 and phase shifter and combining circuit 25, column 2 lines 43-53, the 90 degree phase shifters are commonly implemented in semiconductor integrated circuits using polyphase networks) having inputs receiving the current mode in-phase mixed signal (output of mixer 8) and the current mode quadrature-phase mixed signal (output of mixer 9).

However, Mourant fails to disclose wherein the current mode in phase mixed signal and the current mode quadrature phase mixed signal are coupled together with passive components.

The teaching of a poly-phase filter network (PPF) constructed with passive components is well known in the art, said poly phase filter network is disclosed in figure 5 (Prior Art Admission by the applicant) or figure 3 of Ciubotaru, and said poly phase filter network is widely used in conventional image rejection mixers as disclosed in figure 2 (Prior Art Admission by the applicant) or figure 3 of Ciubotaru.

Therefore at the time the invention was made, a person skilled in the art would easily include the well-known poly phase filter network wherein constructed with passive

components for circuit simplicity or as an alternative of the poly phase filter network 24, 25 of Mourant.

Consider **claim 2 as applied to claim 1**, Mourant as modified by Ciubotaru clearly discloses wherein the inputs of the polyphase filter network are directly connected to the outputs of the in-phase mixer and the quadrature-phase mixer (see figures 1a and 1b, polyphase networks 24 and 25 are directly connected with doubly balanced mixers 8 and 9).

Consider **claim 3 as applied to claim 1**, Mourant as modified by Ciubotaru clearly discloses further comprising an inductor coupled between an output of the polyphase filter network and a supply voltage to convert an output of the image rejection mixer to a voltage mode signal (figures 1a and 1b, inductors 43 and 44, supply voltage Vcc).

Consider **claim 4 as applied to claim 1**, Mourant as modified by Ciubotaru clearly discloses wherein the received RF signal, the in-phase reference signal, and the quadrature-phase reference signal are differential signals; the in-phase and quadrature-phase mixers are differential mixers (Abstract); and the polyphase filter network has two differential inputs and one differential output (figure 1a, polyphase network 24 has two differential inputs and one differential output 46).

Consider **claim 5 as applied to claim 4**, Mourant as modified by Ciubotaru clearly discloses further comprising a differential inductor coupled to the differential output of the polyphase filter network and having a center tap being coupled to a supply voltage to convert a differential output of the image rejection mixer to a differential

voltage mode signal (column 2 lines 58-64, figure 1a, inductor 44 coupled to the output of the polyphase network 24 and supply voltage Vcc).

Consider **claim 6 as applied to claim 1**, Mourant as modified by Ciubotaru clearly discloses wherein the polyphase filter network is a single-stage poly-phase filter network (polyphase filter network 24 is a single-stage poly-phase filter network).

Consider **claim 7 as applied to claim 1**, Mourant as modified by Ciubotaru discloses wherein the in-phase and quadrature-phase mixers are Gilbert mixers that share a single current source.

In the same field of endeavor, Ciubotaru clearly discloses the in-phase and quadrature-phase mixers are Gilbert mixers that share a single current source (figure 3, column 3 lines 1-2, current source 410).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection techniques taught by Ciubotaru into the art of Mourant as modified by Ciubotaru as to include Gilbert mixers as an alternate choice.

Consider **claim 8 as applied to claim 7**, Mourant as modified by Ciubotaru clearly discloses wherein the in-phase and quadrature-phase mixers are combined into one mixer unit having open drain outputs cascoded with the inputs of the polyphase filter network (figure 1, mixers 8 and 9 are interacted with one another, and having outputs directly connected with the inputs of the polyphase filter network 24 and 25).

Consider **claim 9**, Mourant clearly discloses a method of mixing a received RF signal with a reference signal and removing an image signal component, the method

comprising (Abstract, figure 1): mixing the received RF signal with an in-phase reference signal to produce a current mode in-phase mixed signal; mixing the received RF signal with a quadrature-phase reference signal to produce a current mode quadrature-phase mixed signal (column 1 lines 36-50, using a 90 degree phase shifted version of the local oscillator signal, commonly known as I and Q signals), the quadrature-phase reference signal and the in-phase reference signal having a substantially orthogonal phase difference (considering I and Q signals are in 90 degree phase difference); and providing a polyphase filter network (figures 1a and 1b, phase shifter and combining circuit 24 and phase shifter and combining circuit 25, column 2 lines 43-53, the 90 degree phase shifters are commonly implemented in semiconductor integrated circuits using polyphase networks) to receive the current mode in-phase mixed signal (output of mixer 8) and the current mode quadrature-phase mixed signal (output of mixer 9), and joining an in phase output and a quadrature-phase output of the polyphase filter network (figure 1, outputs 45, 46), so as to generate a resultant IF signal; wherein the image signal component is cancelled from the resultant IF signal (polyphase filter network 24 and 25 directly coupled to the outputs of the doubly balanced mixers 8 and 9, and produce intermediate frequency signal substantially free of signal images at outputs 45 and 46).

However, Mourant fails to specifically disclose the poly-phase filter network (figure 1, poly-phase filter network 24, 25) is a single network.

The teaching of a poly-phase filter network (PPF) constructed with passive components is well known in the art, said poly phase filter network is disclosed in figure

5 (a single network filter, Prior Art Admission by the applicant) or figure 3 of Ciubotaru, and said poly phase filter network is widely used in conventional image rejection mixers as disclosed in figure 2 (Prior Art Admission by the applicant) or figure 3 of Ciubotaru.

Therefore at the time the invention was made, a person skilled in the art would easily include the well-known poly phase filter network wherein constructed with passive components for circuit simplicity or as an alternative of the poly phase filter network 24, 25 of Mourant.

Consider **claim 10 as applied to claim 9**, Mourant as modified by Ciubotaru clearly discloses wherein the inputs of the polyphase filter network are directly connected to the current mode in-phase mixed signal and the current mode quadrature-phase mixed signal (figure 1, polyphase filter network 24 and 25 directly coupled to the outputs of the doubly balanced mixers 8 and 9).

Consider **claim 11 as applied to claim 9**, Mourant as modified by Ciubotaru clearly discloses further comprising converting an output signal of the polyphase filter network to a voltage mode signal using an inductor coupling the output signal of the polyphase filter network to a supply voltage (column 2 lines 58-64, figure 1a, inductor 44 coupled to the output of the polyphase network 24 and supply voltage Vcc).

Consider **claim 12 as applied to claim 9**, Mourant as modified by Ciubotaru clearly discloses wherein the received RF signal, the in-phase reference signal, the quadrature-phase reference signal, the in-phase mixed signal, and the quadrature-phase mixed signal are differential signals (Abstract); and the polyphase filter network

has two differential inputs and one differential output (figure 1a, polyphase network 24 has two differential inputs and one differential output 46).

Consider **claim 13 as applied to claim 12**, Mourant as modified by Ciubotaru clearly discloses further comprising converting a differential output signal of the polyphase filter network to a differential voltage mode signal using a differential inductor coupled to the differential output of the polyphase filter network and having a center tap being coupled to a supply voltage (column 2 lines 58-64, figure 1a, inductor 44 coupled to the output of the polyphase network 24 and supply voltage Vcc).

Consider **claim 14 as applied to claim 9**, Mourant as modified by Ciubotaru clearly discloses wherein the polyphase filter network is a single-stage polyphase filter network (polyphase filter network 24 is a single-stage poly-phase filter network).

Consider **claim 15 as applied to claim 9**, Mourant as modified by Ciubotaru clearly discloses further comprising (figure 1): providing an in-phase mixer 8 used for mixing the received RF signal with the in-phase reference signal to produce the in-phase mixed signal; and providing a quadrature-phase mixer 9 used for mixing the received RF signal with the quadrature-phase reference signal to produce the quadrature-phase mixed signal.

However, Mourant fails to disclose wherein the in-phase and quadrature-phase mixers are Gilbert mixers, wherein the in-phase Gilbert mixer and the quadrature-phase Gilbert mixer share a single current source.

In the same field of endeavor, Ciubotaru clearly discloses the in-phase and quadrature-phase mixers are Gilbert mixers that share a single current source (figure 3, column 3 lines 1-2, current source 410).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection techniques taught by Ciubotaru into the art of Mourant as modified by Ciubotaru as to include Gilbert mixers as an alternate choice.

Consider **claim 16 as applied to claim 15**, Mourant as modified by Ciubotaru clearly discloses wherein the in-phase and quadrature-phase Gilbert mixers are combined into one mixer unit having open drain outputs cascoded with the inputs of the polyphase filter network (figure 1, mixers 8 and 9 are interacted with one another, and having outputs directly connected with the inputs of the polyphase filter network 24 and 25).

Consider **claim 17**, Mourant clearly discloses an image rejection mixer comprising (Abstract, figure 1): an in-phase mixer for mixing a received RF signal with an in-phase reference signal to produce an in-phase mixed signal at outputs of the in-phase mixer; a quadrature-phase mixer for mixing the received RF signal with a quadrature-phase reference signal to produce a quadrature-phase mixed signal at outputs of the quadrature-phase mixer (column 1 lines 36-50, using a 90 degree phase shifted version of the local oscillator signal, commonly known as I and Q signals), the quadrature-phase reference signal and the in-phase reference signal substantially having a substantially orthogonal phase difference (considering I and Q signals are in

90 degree phase difference); and a polyphase filter network (figures 1a and 1b, phase shifter and combining circuit 24 and phase shifter and combining circuit 25, column 2 lines 43-53, the 90 degree phase shifters are commonly implemented in semiconductor integrated circuits using polyphase networks) having inputs receiving the in-phase mixed signal (output of mixer 8) and the quadrature-phase mixed signal (output of mixer 9); wherein the outputs of the in-phase mixer (doubly balanced mixer 8) and the outputs of the quadrature-phase mixer (doubly balanced mixer 9) are cascoded to the polyphase filter network (figure 1).

However, Mourant fails to specifically disclose wherein the in phase mixed signal and the quadrature phase mixed signal are coupled together with passive components.

The teaching of a poly-phase filter network (PPF) constructed with passive components is well known in the art, said poly phase filter network is disclosed in figure 5 (Prior Art Admission by the applicant) or figure 3 of Ciubotaru, and said poly phase filter network is widely used in conventional image rejection mixers as disclosed in figure 2 (Prior Art Admission by the applicant) or figure 3 of Ciubotaru.

Therefore at the time the invention was made, a person skilled in the art would easily include the well-known poly phase filter network wherein constructed with passive components for circuit simplicity or as an alternative of the poly phase filter network 24, 25 of Mourant.

Consider **claim 18 as applied to claim 17**, Mourant as modified by Ciubotaru clearly discloses wherein the inputs of the polyphase filter network are directly connected to the outputs of the in-phase mixer and the quadrature-phase mixer (figure

1, the inputs of the polyphase filter network 24 and 25 are directly connected to the outputs of the doubly balanced mixers 8 and 9).

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to:**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**Hand-delivered responses** should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RuiMeng Hu whose telephone number is 571-270-1105. The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*RuiMeng Hu*
R.H./rh
July 11, 2007

Nguyen Vo
7-18-2007

NGUYEN T. VO
PRIMARY EXAMINER